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Pesticide Fact Sheet Number 130: Dinoseb

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This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

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EPA

Pesticide Fact Sheet

Name of Chemical: DINOSEB
Reason for Issuance: Special Review/Emergency Suspension
Date Issued: October, 1986
Fact Sheet Number: 130

1. Description of Chemical

Common Name: Dinoseb (includes parent chemical as well as four salts)

Chemical Name: 2-(sec-butyl)-4,6-dinitrophenol

Trade Names: DNBP, DNOSBP, "dinitro", dinoseb (F-ISO), Caldon, Sinox, Vertac General and Selective Weed Killer, Basanite, Chemox General & PE, Chemsect, Dinitrex, Dinitro-3, Dinitro General, Drexel Dynamite 3, Dynamite, Elgetol 318, Gebutox, Hel - Fire, Kiloseb, Nitropone C, Subitex, Unicrop DNBP, Vertac Dinitro Weed Killer 5, Dynanap, Premerge Plus,with Dinitro, and Klean Krop.

EPA Shaughnessy Code: 037505

Chemical Abstracts Service (CAS) Number: 88-85-7

Year of Initial Registration: 1948

Pesticide Type: Fungicide, Herbicide, Insecticide, Desiccant

Chemical Family: Dinitrophenol

U.S. and Foreign Producers: Baird and McGuire, Uniroyal Chemical Company, Cedar Chemical Corp., Hoechst AG, S.H. Marks Co. Ltd., Universal Crop Protection Ltd., S.N.P.E., Combinatal Chimic Fararar.

2. Use Patterns and Formulations

Dinoseb is a contact herbicide widely used to control broadleaf weeds. Approximately 180 registered products contain dinoseb (or its 4 salts) as an active ingredient. The four salt formulations are alkanolamine, triethanolamine, sodium and ammonium. Between 7 and 11 million pounds of dinoseb active ingredient are sprayed annually as a liquid from airplanes, tractor-drawn equipment and hand held equipment. The major use sites by volumne include soybeans (40%), cotton (15%), potatoes (16%), peanuts (9%), alfalfa (4%), snap beans (2%), peas (2%), grapes (2%) and almonds (1%).

- Uses of Dinoseb

Agricultural Uses: Food Crops- alfalfa, almonds, clovers, apples, apricots, barley, beans, blackberries, blueberries, boysenberries, cherries, citrus, corn, cotton, cucurbits,

currants, dates, figs, garlic, gooseberries, grapes, hops, loganberries, nectarines, oats, olives, onions, peaches, peanuts, pears, peas, pecans, plums, potatoes, raspberries, rye, soybeans, strawberries, walnuts, and wheat. Terrestrial Non-Food Crops- clovers, birdsfoot trefoil, dichondra, flax, and timothy.

Aquatic Management: drainage ditches

Ornamentals: bulbous iris, daffodil, gladiolus, ligustrum, lilac, narcissus, roses, spirea, tulip, yew.

Forest Management: brush control, conifer release.

- Methods of Application: aerial, tractor-drawn ground boom, hand-held sprayer.

- Types of Formulations: The majority of products are soluble and emulsifiable concentrates. Other formulations include granular and flowable concentrates.

3. Scientific Findings

- Chemical Characteristics

Dinoseb is a dark brown/reddish brown solid or viscous liquid with a pungent odor. Depending on the technical formulation, dinoseb is soluble in toluene, petroleum oil, ether, ethyl alcohol, ethanol, n-heptane, slightly soluble in water, and miscible in ethyl ether and xylene. Dinoseb has a melting point range from 30-34°C. Technical dinoseb contains at least 90 percent active ingredient.

- Toxicological Characteristics

  Dinoseb causes developmental toxicity in laboratory animals and may pose a risk of birth defects in pregnant women. Biologically and statistically significant increases in malformations and/or anomalies were observed in a recently submitted rabbit teratology study. The primary malformations or anomalies observed were in the neurological and skeletal systems. Based upon a NOEL of 3/mg/kg/day, the Agency has calculated Margins of Safety (MOS). At all use sites the MOS is less than 100, and in many cases less than 1. The risk of birth defects is greatest for those women exposed at the dinoseb application site.

  Dinoseb is acutely toxic to humans and has been classified into Toxicity Category I (acute oral LD_{50} rat = 40-60 mg/kg). Several human fatalities have been attributed to dinoseb piosonings. The EPA Toxicity Peer Review Committee has tentatively concluded that dinoseb be classified as a Category C carcinogen (limited evidence of carcinogenicity in animals)

  due to statistically significant elevations of liver adenomas in the mid and high dose groups of test animals.

  Studies in laboratory animals indicate that dinoseb has the potential to cause male sterility, cataracts, and damage to the immune system. Also, several formulations are contaminated with nitrosamines (cancer causing substances).

- Physiological and biochemical behavorial characteristics

  Dinoseb interferes with the basic energy metabolism of cells. Specifically, it " uncouples" oxidative phosphorylation by preventing the conversion of adenosine diphosphate (ADP) to adenosine triphosphate (ATP). This is a basic energy conserving step in cell biochemistry and, when disrupted, results in other cellular changes such as increased oxygen uptake and increased permeability of mitochondria to hydrogen ions.

  The above effect on energy metabolism may be a common denominator for all toxic events observed in man and laboratory animals when exposed to dinoseb.

- Environmental Characteristics: Available data indicate that dinoseb has the potential to leach to groundwater. Residues in the range of 1-5 ppb have been found in groundwater in potato growing regions of New York, Maine, and Massachusetts.

- Ecological Characteristics: Dinoseb is highly toxic to birds, mammals, and invertebrates and may pose a risk to non target organisms including endangered or threatened species.

- Tolerance Assessment: Tolerances were established in 40 CFR 180.281 for residues of dinoseb and its hydrolyzable salts.

4. Summary of Agency's Regulatory Position and Rationale

After considering a range of regulatory options to mitigate exposure to dinoseb, the Agency has decided to emergency suspend all registrations. Data indicating that the use of dinoseb may pose a risk of inducing developmental toxic effects in humans is the basis for this action. This risk is presented not only to mixers, loaders and applicators of dinoseb, but also to persons entering treated fields or exposed through spray drift. There is no hazard to persons consuming food that has been treated with dinoseb. In conjuncture with this action, a Notice of Intent to Cancel all dinoseb registrations has been issued. The Administrator has determined that continued registration of dinoseb poses an imminent hazard during the period in which administrative hearings could delay the effectiveness of the cancellation of these registrations.

- Benefits Analysis: Suspension of all herbicide, fungicide and desiccant uses of dinoseb would be expected to result in first year losses primarily at the farm level of $80 to 90 million.

5. Contact Person

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